

## ABSTRACT

A method of calibrating a positioning stage includes placing a substrate on the positioning stage. The substrate has a contrast film above a portion of the substrate. At least one pattern is at a predetermined location above the substrate, corresponding to a predetermined  
5 location on the positioning stage if the positioning stage has zero offset from a registration position. A beam is applied to a position where the pattern on the substrate would be located if the positioning stage has zero offset. At least one of the group consisting of reflected, transmitted and scattered portions of the beam is measured. Whether the positioning stage has a non-zero offset is detected based on the measured portion of the beam.